Enclosure B-1

Cokemaking Segment Information

Possible BAT/NSPS/Pretreatment Options

! *Clean Water Act Requirements*

The Clean Water Act requires that EPA periodically review and revise, as appropriate, categorical, technology-based effluent limitations guidelines and standards for use in the NPDES permit and pretreatment programs. The Act identifies three types of pollutants that must be regulated by the effluent limitations guidelines and standards, and specifies six levels of treatment for existing and new dischargers, as follows:

Types of pollutants

Conventional:	TSS, BOD_5, oil & grease, pH, and fecal coliform.
Priority:	Cyanide; designated priority metal pollutants (e.g., chromium, lead, mercury, nickel, selenium, zinc); and designated priority organic pollutants (e.g., benzene, benzo-*a*-pyrene, naphthalene, 2,3,7,8-TCDD (dioxin)).
Nonconventional:	Pollutants that are not designated as conventional or priority, but which may exhibit toxic effects in aquatic ecosystems or to humans (e.g., ammonia-N, chlorine, phenols (4AAP), dissolved iron, COD, and 2,3,7,8-TCDF (furan)).

Levels of Categorical Effluent Limitations Guidelines and Standards

BPT - Best Practicable Control Technology Current Available
BCT - Best Conventional Pollutant Control Technology
BAT - Best Available Technology Economically Achievable
NSPS - New Source Performance Standards
PSES - Pretreatment Standards for Existing Sources
PSNS - Pretreatment Standards for New Sources

BPT, BCT, and BAT are applicable to existing direct dischargers; PSES are applicable to existing indirect dischargers; and NSPS and PSNS are applicable to new direct and new indirect dischargers, respectively. Generally, discharges of all types of pollutants may be regulated at BPT and at NSPS; discharges of only conventional pollutants are regulated at BCT; and, discharges of toxic and nonconventional pollutants are regulated at BAT and at PSES and PSNS.

As part of its review of 40 CFR Part 420, EPA is considering whether to revise categorical effluent limitations guidelines and standards for all pollutants of concern in the iron and steel industry at all levels of treatment.

! *Current 40 CFR Part 420 - By-Product Cokemaking*

40 CFR Part 420 limits conventional, nonconventional, and priority pollutants for by-product cokemaking operations, as follows:

	BPT	BAT	BCT	NSPS	PSES/PSNS
Total Suspended Solids	✓		✓	✓	
Oil & Grease	✓		✓	✓	
Ammonia-N	✓	✓		✓	✓
Total Cyanide	✓	✓		✓	✓
Phenols (4AAP)	✓	✓		✓	✓
Benzene		✓		✓	
Benzo-*a*-pyrene		✓		✓	
Naphthalene		✓		✓	
pH	✓		✓	✓	

Major components of the model BAT/NSPS treatment train for both iron and steel and merchant coke plants were dissolved air flotation for oil removal; a free and fixed ammonia still; equalization basin; mix tank for pH control; indirect cooling; and a two-stage activated sludge biological system for removal of organic pollutants and nitrification of ammonia-N. An allowance of up to 50 gallons of dilution water per ton of coke was included for optimization of biological treatment processes. Supplemental allowances were also provided for coke plants with wet gas desulfurization systems and coke plants with indirect ammonia recovery systems. Separate BAT effluent limitations guidelines are in Part 420 for coke plants with physical/chemical wastewater treatment systems incorporating granular activated carbon adsorption. Categorical pretreatment standards (PSES/PSNS) were based on physical/chemical treatment systems incorporating free and fixed ammonia stills and dephenolizers.

! *Possible Revisions to Part 420*

Pollutants to be Limited

In addition to pollutants currently limited, EPA is considering whether to establish effluent limitations guidelines and standards for the following pollutants associated with by-product cokemaking operations:

Nitrate-N	Sulfide
Total Nitrogen	Mercury
Thiocyanate	Selenium
BOD_5	COD

Preliminary BAT Technology Options

Attached are schematic diagrams of four possible BAT treatment technology trains that may provide the technology basis for numerical limitations. Each is described briefly below:

BAT Option A (Figure 1) is based on a combination of physical/chemical treatments (tar removal, ammonia stripping, equalization, indirect cooling) and biological treatment (single-stage activated sludge with nitrification). This option is similar to the end-of-pipe wastewater treatment technology train used to develop BAT for the current Part 420 regulation. The principal differences are: (1) addition of a tar removal step; (2) the deletion of dilution water to optimize biological treatment; (3) nitrification is accomplished in a single-stage biological reactor; and (4) allowances would be made for treating process area storm water and contaminated ground water resulting from coke plant ground water remediation projects.

BAT Option B (Figure 1) incorporates the technologies used in *Option A*, the principal difference being operation of the biological treatment system. Under *Option B*, the biological treatment system would either be operated in a nitrification/denitrification mode in a single-stage biological reactor or in a two-stage biological treatment system incorporating different reactors for nitrification and denitrification. This option is directed at nitrate-N and total nitrogen controls.

BAT Option C (Figure 2) incorporates the technologies used in *Option A* and the following additional treatment steps: lime-precipitation for removal of heavy metals; alkaline chlorination for treatment of residual loadings of ammonia-N, cyanide, and phenols; and effluent polishing with a mixed-media pressure filter.

BAT Option D (Figure 2) incorporates the technologies used in *Option A* and the following additional treatment steps: mixed-media pressure filtration and adsorption on granular activated carbon for removal of toxic organic compounds amenable to adsorption on activated carbon.

It is important to note that while effluent limitations are established based upon the performance of specific technologies, owners or operators of by-product coke plants may use any combination of process changes, process water recycle and reuse, and end-of-pipe wastewater treatment technologies to comply with the numerical effluent limitations guidelines and standards.

Preliminary NSPS Technology Options (Figure 3)

By-product coke batteries that are rebuilt from the pad up may be considered new sources for purposes of a revised Part 420. Under these circumstances, the NSPS technology options would be the same as those for BAT described above.

For greenfield coke plants, a possible NSPS option is to incorporate a zero discharge standard based on nonrecovery cokemaking technology. This option would ensure that any new cokemaking facilities constructed in the U.S. would have minimal environmental impacts.

Preliminary PSES/PSNS Technology Options

Schematic diagrams for three preliminary PSES technology options are included in Figure 4:

PSES Option A is based upon limited pretreatment consisting of tar removal, ammonia stripping, equalization, and indirect cooling.

PSES Option B is the same as *BAT Option A* and would provide for removal of ammonia-N, phenols, thiocyanates, and supplemental treatment of organic pollutants.

PSES Option C is the same as *BAT Option C* and would include lime precipitation for metals removal; alkaline chlorination for control of residual ammonia-N, cyanide, and phenols; and a mixed-media pressure filter for effluent polishing.

PSNS options are set out in Figure 5 and are the same as for NSPS.

Best Management Practices

EPA is considering whether to include in a revised Part 420 the following best management practices for cokemaking operations:

- Collection and treatment of process area storm water;
- Control of runoff from raw material and product storage areas;
- Control of coke oven gas condensates;
- Surveillance and corrective action programs for coke plant noncontact cooling water systems; and
- Control of contaminated ground water resulting from coke plant area ground water remediation projects.

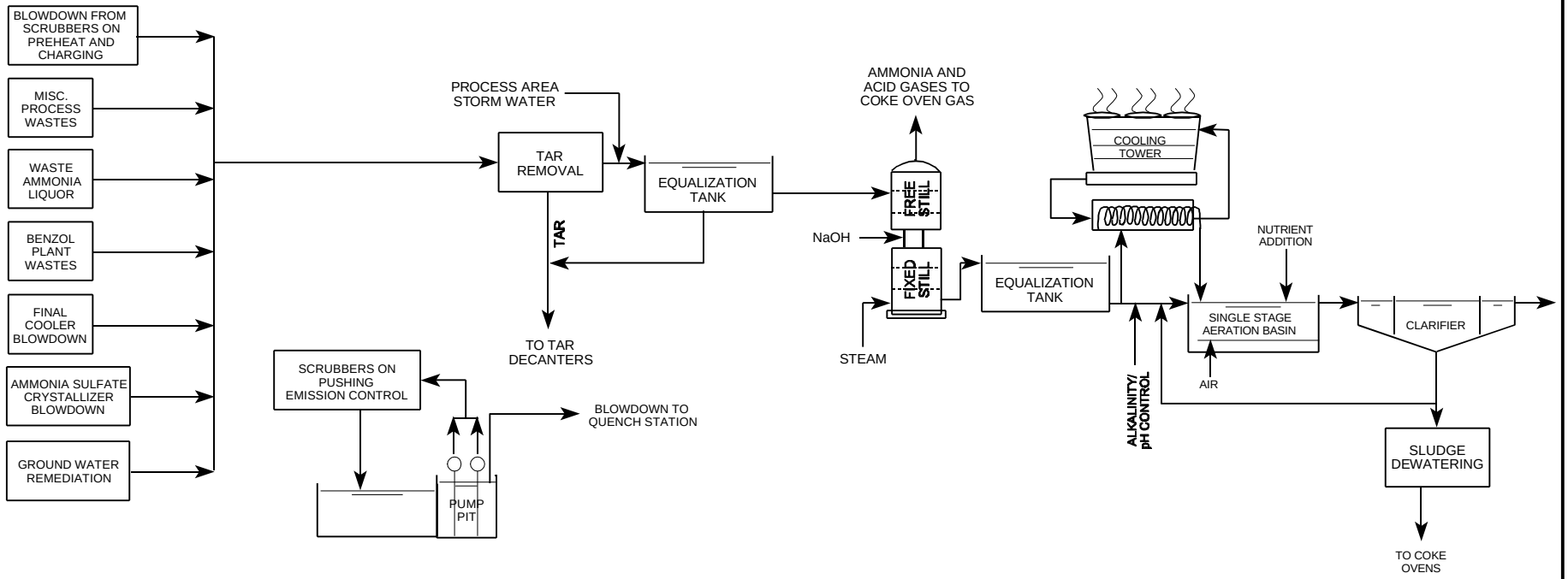
Regulatory Flexibility

EPA is also considering whether to amend the *water bubble* rule at 40 CFR §420.03 to allow for pollutant trades involving captive cokemaking operations at integrated facilities. For example, a higher degree of treatment for ammonia-N in cokemaking wastewater may be used to offset a lesser degree of treatment for ammonia-N in blast furnace wastewater.

Although not yet formulated, EPA may consider incentive programs as part of BAT which could, for example, provide for extended compliance schedules in exchange for advance levels of treatment.

EPA invites comments on these and alternate approaches to regulating cokemaking operations.

BAT OPTION A - BIOLOGICAL TREATMENT W/NITRIFICATION



BAT OPTION B - CONVENTIONAL BIOLOGICAL TREATMENT W/NITRIFICATION AND DENITRIFICATION

SAME AS OPTION A, W/TWO OPTIONS FOR AERATION BASIN

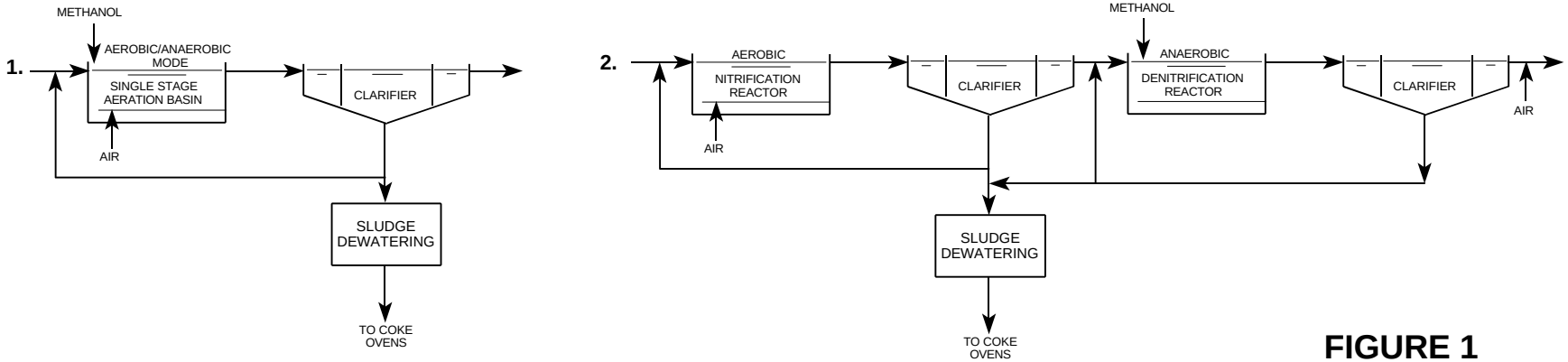


FIGURE 1

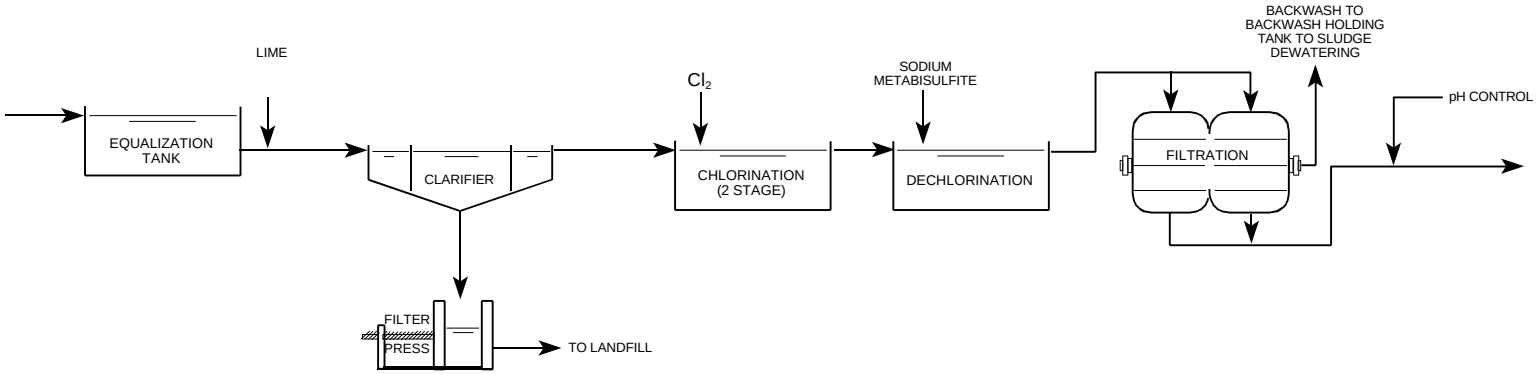
REVISIONS	
#	DATE
1	10/07/98
2	10/15/98
3	12/21/98
4	1/11/99
5	-
6	-

REVISED PART 420
POSSIBLE BAT OPTIONS
BY-PRODUCT COKEMAKING

DRAWING NUMBER	DATE	DRAWN BY
COKE-OPT	08/27/98	MAO

EPA

BAT OPTION C - BIOLOGICAL TREATMENT W/NITRIFICATION
POLISHING W/METALS REMOVAL, ALKALINE CHLORINATION & FILTRATION



BAT OPTION D - BIOLOGICAL TREATMENT W/NITRIFICATION AND GAC POLISHING
SAME AS OPTION A, IN ADDITION TO FINAL CLARIFIER

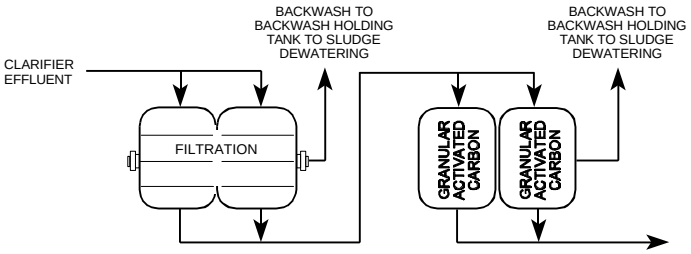


FIGURE 2

REVISIONS	
#	DATE
1	12/21/98
2	1/11/99
3	-
4	-
5	-
6	-

REVISED PART 420
POSSIBLE BAT OPTIONS
BY- PRODUCTCOKEMAKING

DRAWING NUMBER	DATE	DRAWN BY
COKEOPT3	10/15/98	MAO

EPA

NSPS OPTIONS

A. BY-PRODUCT COKE PLANTS: PAD-UP REBUILD OF BATTERIES.

NSPS options same as BAT options for existing sites.

B. GREENFIELD COKE PLANTS:

Nonrecovery cokemaking - zero discharge of process wastewaters.

FIGURE 3

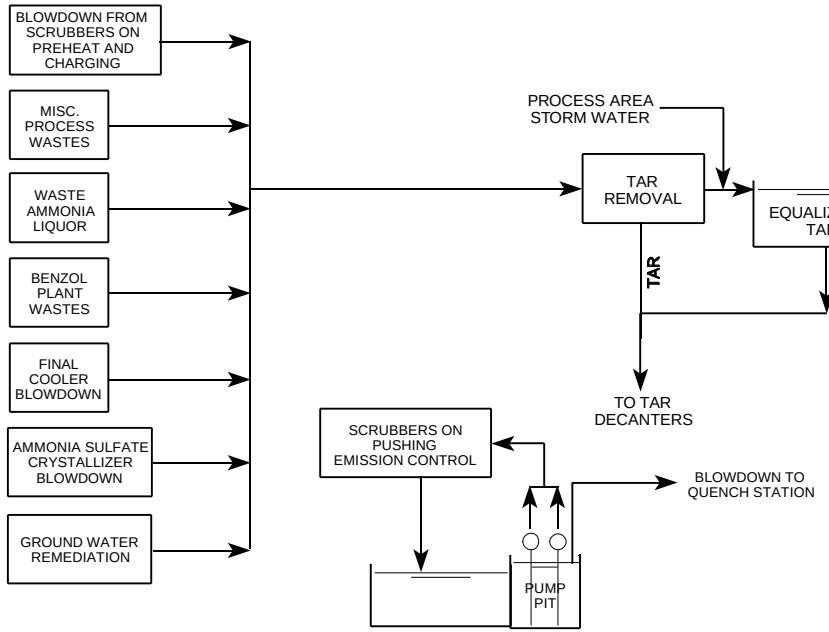
REVISIONS	
#	DATE
1	10/07/98
2	10/15/98
3	1/11/99
4	-
5	-
6	-

REVISED PART 420
POSSIBLE NSPS OPTIONS
BY-PRODUCT COKEMAKING

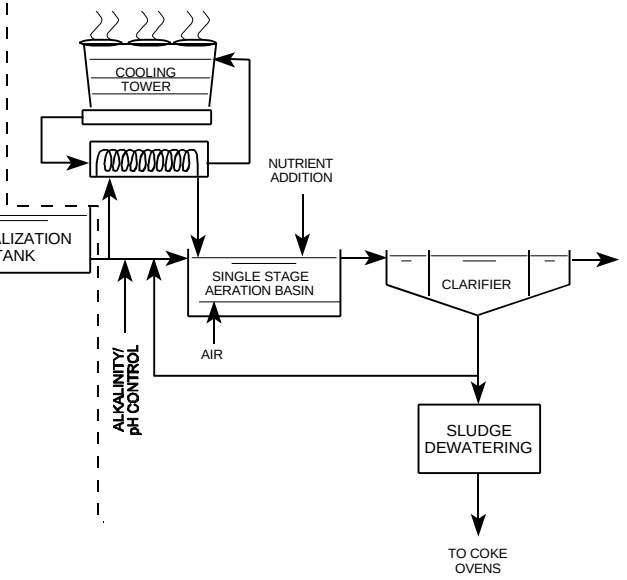
DRAWING NUMBER	DATE	DRAWN BY
COKEOPT2	08/27/98	MAO

EPA

PSES OPTION A -PHYSICAL/CHEMICAL TREATMENT



PSES OPTION B - PHYSICAL/CHEMICAL/BIOLOGICAL TREATMENT



PSES OPTION C - OPTION B PLUS ADVANCED PHYSICAL/CHEMICAL TREATMENT

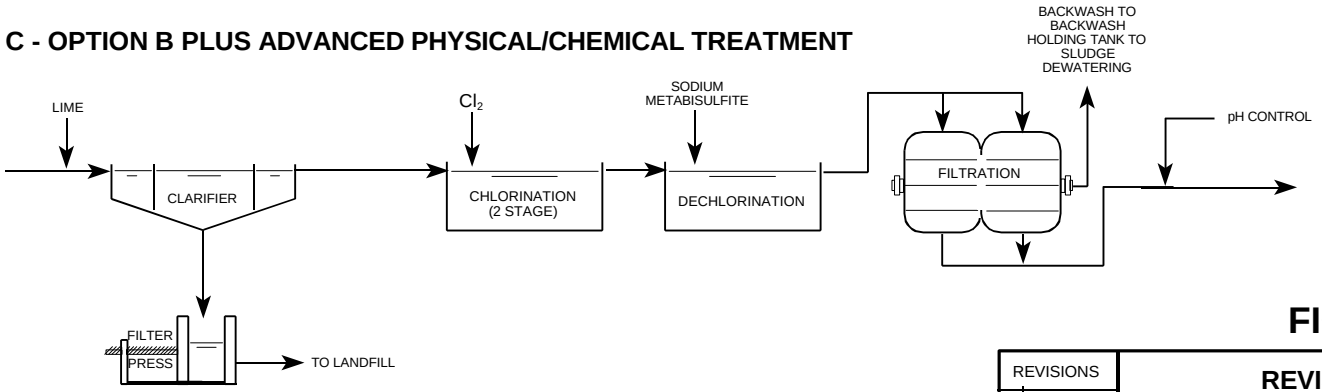


FIGURE 4

REVISIONS	
#	DATE
1	12/21/98
2	1/11/99
3	-
4	-
5	-
6	-

REVISED PART 420
POSSIBLE PSES OPTIONS
BY-PRODUCT COKEMAKING

DRAWING NUMBER	DATE	DRAWN BY
COKE-OPT6	10/15/98	MAO

EPA

PSNS OPTIONS

A. BY-PRODUCT COKE PLANTS: PAD-UP REBUILD OF BATTERIES.

PSNS options same as PSES options for existing sites.

B. GREENFIELD COKE PLANTS:

Nonrecovery cokemaking - zero discharge of process wastewaters.

FIGURE 5

REVISIONS	
#	DATE
1	10/07/98
2	10/15/98
3	12/21/98
4	1/11/99
5	-
6	-

REVISED PART 420
POSSIBLE PSNS OPTIONS
BY-PRODUCT COKEMAKING

DRAWING NUMBER	DATE	DRAWN BY	
COKEOPT5	08/27/98	MAO	EPA